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A N
INQUIRY
INTO
THE CAUSES AND NATURE
OF THE
YELLOW FEVER;
SUBMITTED TO THE EXAMINATION
OF THE
REV. JOHN EWING, S. T. P. PROVOST,
THE
TRUSTEES AND MEDICAL PROFESSORS
OF THE
UNIVERSITY OF PENNSYLVANIA,

On the sixth day of June, 1799,
FOR THE DEGREE OF DOCTOR OF MEDICINE.

BY WASHINGTON WATTS, OF VIRGINIA,
*Member of the Philadelphia Medical and
Chemical Societies.*

Thus distant bugbears fright, but nearer draw,
The block's a block, and turns to mirth your awe.

YOUNG.

PHILADELPHIA:
PRINTED BY JOHN ORMROD,
No. 41, CHESNUT-STREET,
1799.

or Dr. Cox with the comple-
ments of the Author.

D E D I C A T I O N.

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T O

PHILIP S. PHYSICK, M. D.

President of the Academy of Medicine of Philadelphia, and one of the Physicians and Surgeons of the Pennsylvania Hospital.

SIR,

IT is to you that I am indebted for the greater part of the medical and surgical knowledge, which is to conduct me through the arduous task of the profession in which I am about to engage. I feel a heart overflowing with gratitude for the many favours I have received, and the unremitting attention you have paid to my advancement in medical science. But I forbear any eulogy either on the good qualities of your mind as a man and a friend, or the high rank which you so justly sustain in your profession. To your numerous friends and acquaintances it would be superfluous, to yourself probably not agreeable, and to the public, might appear as

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only a conformity to custom ; be pleased to receive this as a mark of esteem and respect due you for your many kindnesses, and at the same time accept the most cordial wishes for the long continuance of your health, and that your future days may be as happy as your former have been useful, is the sincere wish of your friend and pupil,

THE AUTHOR.

INTRODUCTION.

IT may appear strange after so many and such accurate histories have been written on the yellow fever, and by men of unparalleled abilities, that I should presume to say any thing on this disease, in an inaugural dissertation, but if any distemper from the great distress and mortality which it occasions, could justify such an attempt, I am sure that it is the one which I have chosen for the subject of the present inquiry. The diminution of trade, and the many horrid scenes which it occasions, must render any thing that tends to throw light upon the subject particularly interesting at the present time. The history, cure, &c. have been so minutely and accurately detailed by Doctor Rush, in his different publications on this disease, that to say any thing on those heads would be mere repetition: I shall therefore, confine my observations to the causes and nature of this fever. I am aware of the unpopularity of the opinions which I shall deliver in the following performance, but I am induced to offer them from a conviction of their foundation on the firm basis of truth. The calamity accompanying this disease has been greatly augmented from a belief that it is a new and a contagious fever.

Thousands, I am disposed to believe, have fallen sacrifices to this last opinion ; the well have been rendered pre-disposed to it, from the constant debilitating operation of fear, while the sick have been neglected, or badly attended by physicians ; for what man can prescribe with any degree of judgment who is afraid even to feel the pulse of his patient ? or if he venture thus far, the dread of receiving the infection prevents him from acquiring much information. Every tie so dear between friends and relations has been broken ; husbands deserted by their wives, and wives by their husbands. Parents shunned by their children, and children turned into hospitals to be nursed by strangers ; brothers have become the dread of sisters, and sisters abandoned by brothers. The sick committed to the charge of mercenary attendants, from whom they could receive none of the soothing attention so pleasing in a sick room ; and those whose circumstances could not allow an extravagant reward to nurses, have been left to the ravages of a disease not necessarily mortal but rendered so by neglect. In 1798, many of the poor of Philadelphia, amongst whom this fever exhibited its utmost degree of malignity, fell victims to it from entertaining the opinion of its being contagious.

Though an hospital was early prepared for the accommodation of the unfortunate sick, they ap-

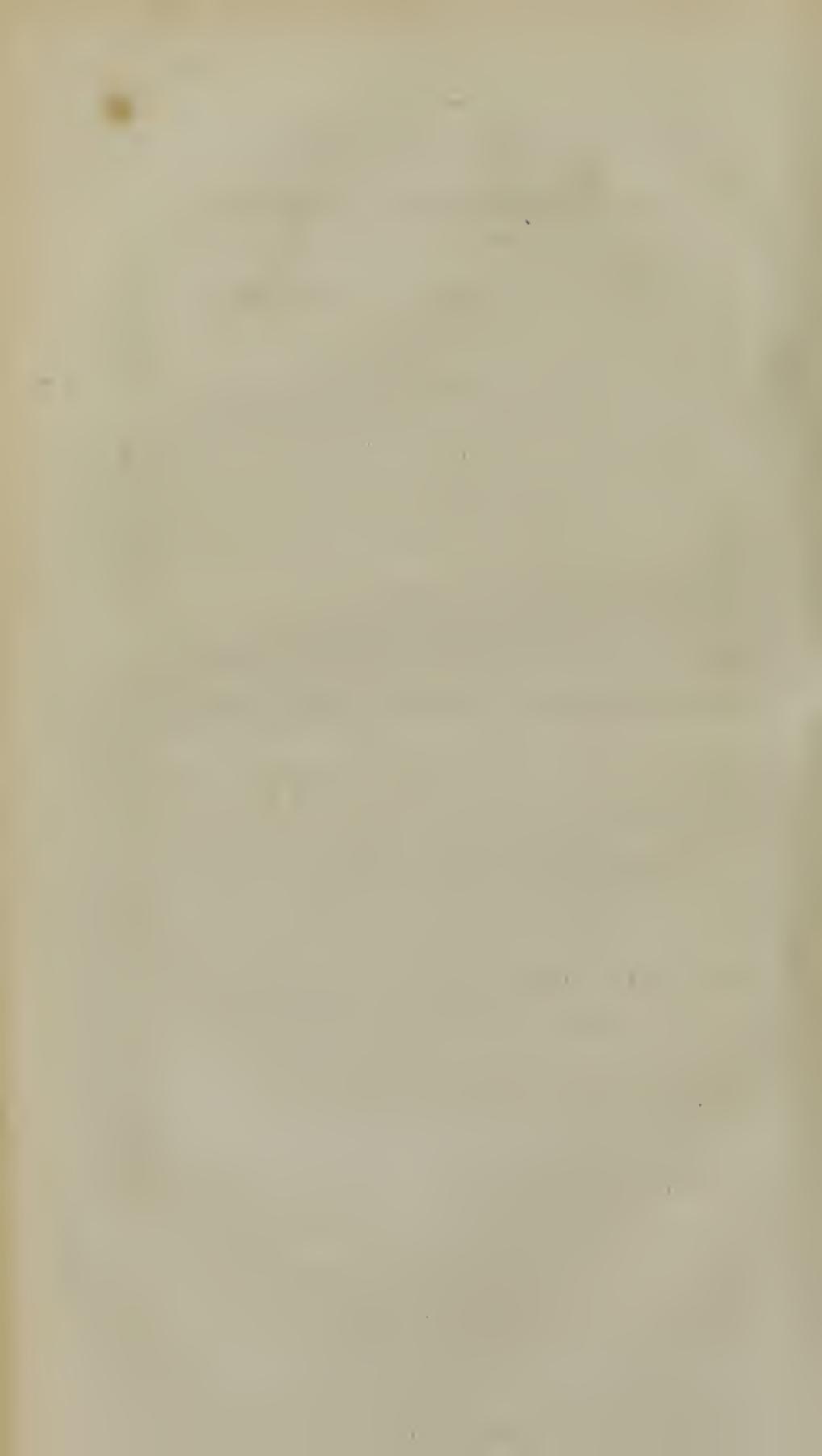
peared to resort to it only to die. Many from a doubt whether they had the fever or not, delayed making application to the hospital, until medicine could be of no benefit to them, believing that they might possibly not have the disease, and if so, they would certainly receive the infection from such a number being collected together ; and while these delusive fears were playing on their imaginations, death was making rapid strides to complete their destruction. If such be the direful effects produced by this belief, is it not excusable at least, to inquire into the truth of its foundation ?

I shall divide the subject of the following inquiry into three distinct chapters.

Chapter I. The causes of intermittent, remittent, bilious and yellow fever shall be considered.

Chapter II. I shall make a comparison between the bilious and yellow fever, and endeavour to establish the identity of these two diseases.

Chapter III. I shall endeavour to prove from numerous facts and arguments that the yellow fever possesses none of the essential characters of a strictly contagious disease.



YELLOW FEVER.

SEC. I. REMOTE CAUSE OF YELLOW FEVER.

IT may be necessary to premise, that I do not intend entering into the various controversies and disputes, which have so frequently existed in Philadelphia, and other parts of the United States, where this fever has made its appearance, in regard to the importation or non-importation of it, from the West Indies or elsewhere.

It will not, I am persuaded, be denied by any one (not even the warmest advocate for the importation of this fever) that the intermittent, remittent and bilious fevers of common years are diseases indigenous to our country, and proceed from causes evident amongst ourselves. I hope to make it appear hereafter, that no specific difference exists between these diseases, and that designated by the name of yellow fever.

For the production of these fevers, or rather fever, there appears to be wanting the concurrence of three circumstances (in all countries) viz, heat, moisture, and decaying vegetable or animal substances; heat (though generally reputed the cause

of unhealthiness in warm climates) alone is not sufficient for the production of pestilential diseases; examples of which are daily seen; thus the inhabitants of situations remote from marshes, in elevated, dry and airy places, remain healthy during the greatest heats which have been known in this country. * Dr. Lind states, that the inhabitants, remote from marshes, enjoy good health in the West Indies, while others, living but a few miles distant, are afflicted in a dreadful manner, and says, the greater or less violence of the fevers marked in some measure the nature of the soil. Simple moisture is harmless, so far as relates to the production of fevers, as is strongly exemplified in the healthiness of certain districts, perfectly surrounded by running rivulets, when the most vigorous evaporation is constantly going on, (which must render the atmosphere very humid) as is proved by the immense dews which fall during the summer and autumn. Dead animal and vegetable matter emits, nothing noxious unless in a state of putrefaction, for which a certain degree both of heat and moisture are essential, as is evident from these substances remaining inoffensive during the cold of winter. In proportion as the above circumstances concur, will be the greater or less production of these noxious miasma or poisonous bodies, and the more concentrated these effluvia are, the more violent will be their effects.

Thus we frequently see persons living nearest to marshes, will be afflicted with remittents of the highest grade, while others living farther from this source of poison, are affected with the mildest intermittents, we also observe the inhabitants of narrow, dirty streets much more violently seized with yellow fever than persons living in wide airy ones; this can only arise from the particles mixing with the atmosphere, which dilutes and renders them less active in their operation.

It is no objection to this doctrine, that no such particles have as yet been discovered to exist in the air, during the prevalence of these epidemic diseases, or that we do not know their precise mode of operation. For a long time the atmosphere was considered as a homogenous mass ; but the fruitful genius of chemistry has long since discovered its component parts to be essentially different, and some future investigator (more successful in his researches than his predecessors) may discover the nature of this destroyer of the human race, and also its mode of operation : until this happy acquisition in science shall arrive, we must be content with a knowledge of its causes, and try to guard against its formidable effects.

That the miasmata emitted from animal and vegetable substances during their putrefactive pro-

cess, form the remote cause of remittent, bilious and yellow fever, will appear probable.

I. From those fevers occurring at stated periods, and disappearing at certain others, which are known to be most favourable to the production of the putrefactive process, and from their greater or less violence, according as this process is carried on with more or less vigour, and in proportion to the quantity of matter so disposed. Hence the large commercial cities are more frequently and severally attacked with these fevers, than country places similarly situated with respect to heat and moisture.

Many sources concur in rendering fevers more violent in large towns, as,

1st. They are for the most part situated (more from the convenience of commerce, than the preservation of health) on low flat grounds, close along the shore of rivers, which are subject to the flow and ebb of the tide.

2nd. Narrow, unventilated streets, back yards close walled, in which rain, and water thrown from the houses is confined.

3d. The greater quantity of vegetable and animal substances in a state of putrefaction, city grave yards, privies, &c.

4th. The greater degree of heat from the reflection of brick walls and pavements.

5th. The greater number of people crowded together in small apartments, breathing the air which has before been deprived of its vital principle by having been so often respired.

6th. The greater irregularity of citizens with respect to their manner of living.

7th. The more frequent collection of strangers in large towns, must all concur in subjecting large cities to the worst diseases which climate can inflict.

II. Men are observed to be affected more frequently and severely than women, the young and robust oftener than old people and children, this is not owing to any thing in the constitutions of persons of these classes, that exempts them from disease, for old people, women and children, are as frequently and violently attacked as men, when they expose themselves to the vicissitudes of the atmosphere, and commit excesses which men are too liable to do.

III. Sailors and poor people, from their frequent exposure to the scorching rays of the sun during the day, and cold air of night, also, to

their being exposed to the noxious exhalations along shore, and other filthy places favourable to the production of this miasmata, being most frequently afflicted with bilious remittents.* Such are the mortal effects of these exhalations at Kingston, Jamaica, that there are examples, in which out of sixty or seventy men employed on the watering service, not one having escaped. That these miasmata were the cause, is proved from the crews enjoying good health when out at sea, and being again seized with the same fever on their return into harbour. Were one of our American vessels to arrive from the West Indies in the month of July or August, and sixty or seventy of her men to be taken sick before getting into port, could any thing short of divine inspiration convince the citizens that their disease proceeded from marsh exhalation, and that it was not contagious? I am disposed to believe, from late occurrences, they would ridicule the idea of there being any thing in our healthy country competent to the production of such effects.

IV. This fever prevails in low, marshy grounds during the heat of summer, when the patients have not been exposed to an imported contagion.

* Dr. John Hunter on the disease of Jamaica.

V. From the winds rendering these diseases more or less frequent as they blow over marshes, or not :—a remarkable instance of the effects produced by a change of wind, is recorded by Lancisius*—“thirty gentlemen and ladies of the first rank in Rome, having made an excursion upon a party of pleasure towards the mouth of the Tyber, the wind suddenly shifted, and blew from the south over the putrid marshes, when twenty nine were seized with a tertian fever, one only escaping.” Doctor Lind says, the health of the island Balambangam is regulated by the winds. From October until April, the winds blow from the north-east over the sea, during which time the inhabitants are healthy; but no sooner does the winds change and blow from the south-west over the marshes, than fevers of the most malignant nature make their appearance, cutting off the stoutest men in twelve or fourteen hours, and prevailing with such violence, during the continuance of the wind from that quarter, that scarce one in ten survived them. It is a fact too notorious to be denied, that the inhabitants of the south side of a swamp, or any stagnant water-course, are much healthier during the summer and autumn, when the winds are, for the most part, from that quarter, than those living on the north side.

* Lind on the diseases of hot climates, page 100.

VI. From cold weather and heavy rains checking the ravages of those fevers, which happens only by their putting a stop to the putrefactive process.

VII. From these fevers sometimes making their appearance in parts of the country which have been accidentally overflowed. A remarkable instance of this kind took place in Virginia; a few years ago a mill-dam broke and overflowed a large tract of land, and in a little time, all vegetation was arrested by being covered with water, and a great number of fish, &c. left entangled in the grass; they emitted a very nauseous exhalation, which proved destructive to several persons in its immediate neighbourhood. Another fact of a similar nature occurred at a place called "the Red Bank" in the state of New-Jersey, as related by Doctor Otto to the academy of medicine of Philadelphia†: Coffee in a state of putrefaction, produced a most malignant fever in Philadelphia in 1793, which proved particularly destructive to those persons living most contiguous to it. † "Without the matrix of a putrid vegetable matter, there can no more be a bilious fever generated amongst us, than there can be vegetation without earth, water or air."

† Doctor Rush's Medical Enquiries, Vol. 5.

‡ Ditto,

Ditto, Vol. 3, page 168.

But while vegetable and animal substances are allowed to accumulate and putrify in large towns and cities, and while similar causes, under like circumstances, produce the same effects, the bilious fever will rage with a violence corresponding to its causes. It may probably be said, that malignant bilious fevers sometimes occur in the country, where no such putrefactive process is ascertained to exist; but this noxious matter frequently arises from sources unsuspected; for we are by no means at a loss for cases of the most mortal fevers having been produced from a heap of putrid vegetables confined in a cellar: And further, we are, as yet, ignorant of the precise distance to which this exhalation may be carried by winds, or otherwise.

It appears that every country has its sickly seasons at which the diseases peculiar to that country, become more or less general and severe—And these diseases are observed to appear with greater mortality in some years than in others, and much more general and malignant at some places, in the same year and season, than at others. Thus, in summers but moderately warm with occasional showers of rain, the intermittent is the prevailing autumnal epidemic, but if the summer and autumn be uncommonly dry and warm, with long periods of calm weather, the bilious remittent or yellow fever becomes the epidemic, especially in large commercial cities.

At Cadiz, in Spain, after the long continuance of excessive heat and drought, violent epidemic bilious disorders arose in September and October 1764 resembling those of the West Indies, of which a hundred persons often died a day ; at this time the wind blew mostly from the south, and after sun-set unusual quantities of dew fell. In 1762* the yellow fever prevailed with great violence in Philadelphia after an uncommonly warm summer. In Charleston † (South Carolina) it prevailed with great mortality in 1732, 1739, 1745 and 1748 during the continuance of extremely hot weather. In 1791 and 1795 in New York. In 1793 in Philadelphia, the yellow fever was epidemic, and raged with a mortality almost unheard of before, in this country, destroying for some time from fifty to a hundred persons a day. ‡ In this year there was no rain between the 25th of August and the 12th of October ; excepting a few drops, hardly enough to lay the dust of the streets, on the 9th of September, and the 12th of October, (as appears from the register of the weather.) There was something uncommon in the atmosphere of this summer and autumn in its mode of operation on the body. Labourers every where gave out (to use the common phrase) in harvest, and frequently when the mercury, in Farenheit's thermometer, was under 84° ; from many obser-

* Dr. Rush's Medical Inquiries, vol. 3, page 13.

† Dr. Lining's History of the yellow fever, Medical Tracts, vol. 2.

‡ Dr. Rush's Medical Inquiries, vol. 3.

vations it appears that an uncommon calmness excited in the atmosphere for a length of time. In* 1794, the yellow fever was in Philadelphia, but did not become epidemic, being checked by the influence of occasional showers and gentle breezes. In 1797 at the same place it became again epidemic, but was not so universal or mortal, (from the weather not being so warm or calm) as in the year 1793. In the Havanna, in 1794, it raged with such malignity, as in about two months, to have destroyed two thousand patients ; it was suddenly put a stop to, by a most furious storm, on the 27th of August of the same year.

It may not be amiss to notice here the very long continuance and excessive degree of heat, which existed in the summer and autumn of 1798, not only in Philadelphia, but throughout the United States, from Massachusetts to Georgia, insomuch that vegetation was for a lengthy period, perfectly extinct, the rivers, creeks, &c. left their banks, and gradually evaporated into the air, rendering it extremely humid, as appeared from the immense dews, which fell during the summer and autumn. May not this considerable suspension of vegetation lead to explain in some measure the uncommon general prevalence of bilious remittents as also of their aggravated malignity throughout so extensive a district ?

* D. Rush's Medical Inquiries, vol. 4, page 102.

Thus I might go on to shew, that, at every period in which the Yellow Fever has appeared in the United States or elsewhere and became epidemic; that it was more or less malignant according to the states of the atmosphere at the places where it raged: but I forbear to enlarge upon a subject which is so self-evident, that the most superficial observer cannot have passed it over unnoticed.

C H A P T E R II.

On the Similarity of Bilious and Yellow Fever.

We now arrive at a more important consideration, no less than an attempt to prove as far, as inductive demonstration is adequate, that the disease which has prevailed so extensively and mortally throughout the United States under the vague and improper denomination of Yellow Fever, does in no instance differ from the bilious, remittent of common years, indigenous to our climate, excepting in degree of violence, and I shall also undertake to establish an unity of cause to exist between them, that is, their common origin from, and influence by certain sensible and insensible qualities of the atmosphere. For this purpose I shall take it for granted, that the bilious fever owes its origin to no other cause than what has already been advanced (to wit, Marsh Miasmata). The consequent indication then is to contrast the

two diseases in all their more essential circumstances and let the result establish the question.

This fever and the bilious remittent agree in the following circumstances, viz. In being epidemic at a certain season which is usually from July to November, in being inhabitants, of the same district of country, in occurring at stated periods, which are known to be most favourable to the production of animal and vegetable putrefaction. In becoming more generally and universally epidemic in summers which are remarkable for extreme and excessive degrees of heat. In appearing more frequently and with more violence in large commercial cities, and low marshy countries, than in high elevated and airy situations. In attacking new comers and strangers oftener and with more malignity than the natives. In proving more destructive to hard drinkers and persons given to excesses of any kind. Old people women and children are less obnoxious to both, than the young and robust. In their superior violence amongst sailors and poor people than others less exposed to the vicissitudes of the atmosphere. In attacking the same person as often as the causes are applied which give origin to them. In sometimes commencing their assault in the form of an intermittent with regular paroxysms and intermissions and gradually changing to a continued or remittent type : and at other times beginning with a continued or remitting type, and gradually retreating to that of

a common intermittent. In being more rapid in their progress and running through their different stages in a shorter time, during the hot months of summer, than in cooler weather—In mixing with and chasing away all other fevers of a lower grade, during the time in which they are epidemic. In pervading great extents of country at the same time —In being eradicated by cold weather, and checked by heavy rains.

In their symptoms they also discover a very great analogy, viz. in commencing sometimes with and at other times without a cold fit or rigor. In pain in the head and back with a sensation of soreness all over the body, sickness at stomach, nausea and vomiting, red eyes &c. being all symptoms common to both. All the symptoms of yellow and bilious fever are so nearly alike that persons affected with either frequently suppose they have a common cold or intermittent fever. In the stomach being the viscus most affected as appears from the incessant vomiting so common in these fevers; and from dissections after death discovering the same phenomina in both. In sometimes being attended with a preternatural quantity of bile, and at other-times, a deficiency of this secretion. In yellowness sometimes appearing in the eyes and on the skin about the third or fourth day.* They both alike yield to the same remedies varied according to the

* For a more accurate and minute history of these fevers similarity, the reader is referred to Dr. Rush's several publications.

greater or the less violence of the symptoms. It is no objection to this doctrine that large and repeated bleedings have not been commonly practised in the common bilious fever, on which in yellow fever our greatest dependence is placed. This arises merely from the grade of action which takes place in bilious remittents, of common years, being much inferior to that in yellow fever, and hence purges have been generally adequate to the cure of these milder remittents, whose efficacy results solely from their depleting power, like blood letting.

In their manner of termination also they exhibit a further similitude, viz. all symptoms of fever disappear sometimes about the third, fourth or fifth day; the patient and his physician (if he has not before seen the insidious nature of their progress) considers the complaint to be giving way; but alas, a few days or even hours too often convince them of their fatal error, and they are mortified in seeing death approach with all its horrid concomitants, as, subsultus tendinum delirium, black vomiting * and convulsions. At other times the unwelcome guest makes his advances with more

* The black vomit occurs only in such cases as terminate fatally, as a recovery after its appearance in Adults has never been known. It has caused the fever to be designated by the particular name of black vomit in many parts of the world. A deep coloured green bile has frequently been mistaken for this matter, and hence the frequent cures we hear of after this symptom.

quietude and gentleness, and terminates the unhappy victims existence as if lulled in sleep.

They sometimes terminate in a few days and at other times continue until the twentieth or thirtieth day, with little or no intermission ; also in yellowness appearing at one time immediately before death, and at another just after.

They equally terminate in dropsies, obstructed viscera, &c. when depleting remedies have been omitted in the early stages.

They alike degenerate into dysentery, diarrhœa, common intermittents, &c.

From this comparison it seems, that the two diseases agree in most of their essential characters, as, to history, origin, mode of cure, and manner of termination ; and I cannot hesitate for a moment, to believe they arise from the same causes, differing in degree of malignity and violence, in the same manner as the cause of bilious fever differs from that of the intermittent.

The yellow colour which in the West Indies and this country has given this fever its particular name, is altogether adventitious, as great numbers die of the Yellow Fever, without any such change taking place, and others recover, who have had this symptom, though it may be generally thought a bad omén.

The yellow colour and black vomit, which happen in the last stage of this fever, should no more have entitled it to be considered as a distinct species, than the accidental occurrence of purple spots and bloody urine in small pox, should characterise the cases in which they take place, by an appropriate name. As well might we attempt to add to the list of nosological writers, a different and appropriate name, for the cases of dysentery in which the fortuitous appearance of hickup takes place, as distinguish the cases of bilious fever in which the black vomit or yellow colour appears by a specific appellation*. Doctor Hector McLean says after all the instances of this fever which he had witnessed (during a residence of three years at St. Domingo) and all the attention which he could pay to it, he is of opinion, that it is the common remittent of that country, rendered formidable by being applied to the English constitution; that the variety, which appeared in its progress, depended entirely on the variety of the several constitutions which it attacked; and that the yellowness which gives it a peculiar name, only marks its worst stages, and is rather accidental than peculiarly characteristic.

" † These fevers are similar to what has been
" called marsh and remittent fevers, but greatly

* History of the Remittent Yellow Fever of St. Domingo,
Page 71.

† Doctor John Hunter, on the fevers of Jamaica.

" more violent in their attack, quicker in their progress, and more fatal in their termination, than what are seen in Europe ; they proceed from the same causes, noxious exhalation from low, wet, and marshy grounds."

There cannot be a more substantial evidence of the identity of these two fevers, than the great difference of opinion amongst physicians, whenever they make their appearance in any part of the country ; thus while many of the most respectable practitioners of Philadelphia, in the year 1794, declared the Yellow Fever to be in the city, others of great reputation denied its existence. Such contrariety of opinion could not have taken place, had there been any thing specifically different, to have characterised the one from the other. It appears from the report given by the medical gentlemen, to the Board of Health of Philadelphia, during that year, that some were attending patients in the Yellow Fever, and others had many cases of violent bilious fevers, under their care.

Now it is a well known law, that two different actions of unequal force, cannot exist in the same system at the same time ; thus a man cannot labour under the small pox and measles at one time, for the one will undoubtedly give way to the other ; neither can two epidemics of unequal force exist at the same time.

* How many peculiar species soever arise in one and "the same constitution they all agree in " being produced by one common general cause.

Different grades of the same epidemic, often exist in the same family; thus we frequently see one person will have a common intermittent while another of the same house, from some difference in predisposition or exciting cause, may have a high grade of bilious fever; the same thing is seen in small pox; one of a family will have a mild distinct kind, while, a second inoculated from the same matter will be affected with the higher degree called the confluent; here no difference in remote cause could possibly influence the result.

C H A P T E R III.

Proofs of the Noncontagious nature, of Yellow Fever.

We come now at the most important part of this essay, no less than an attempt to prove the Yellow-Fever, possessed of no essentially necessary contagious principle.

There is no part of the history of a disease that it is of more consequence to ascertain with accuracy than its being of a contagious nature or not, upon this must depend the propriety of the steps that should be taken either to prevent or eradicate

* Sydenham, vol. i. p. 14.

it. It is productive of great mischief to consider a disease as contagious which really is not so, it exposes the sick to evils and inconveniences, which greatly aggravate their sufferings and deprives them of the necessary attendance, when they require the greatest care and attention they often get the least; the well are rendered more obnoxious to the disease from the constant debilitating operation of fear.

The belief in the contagious nature of this fever appears to have been generally adopted, from its antiquity rather than from any thing in its nature which could have entitled it to such a character; in no instance more than this do we behold more conspicuously the natural propensity of man, to follow old and established doctrines and opinions, however absurd, rather than subject themselves to the responsibility of innovation; and for this reason it is that erroneous doctrines remain for such a length of time unrefuted.

Contagion has been considered by most authors as the cause of Yellow Fever, without even an attempt to analyze the symptoms or to prove the existence of such a principle, an hypothesis upon the belief of which may depend the lives of thousands.

By contagion is generally understood, a specific matter generated in a body labouring under dis-

ease and capable of communicating that particular disease with or without contact to another by approaching within the sphere of its influence.

It is the general character of contagious diseases to infect all who approach within the limits of their power, those only will escape, who have either not been sufficiently exposed, or at the time of such exposure, laboured under irritations of a more powerful action. Contagion is marked by a rapid and striking progress from any place where it commences and from which it extends without distinction, to all around it, when it has found admittance into any district or country, it lays waste all before it, those who are most forward in visiting and attending the sick, are unhappily the first to be afflicted.

Let us now contrast the Yellow Fever with some strictly contagious disease (as for example the small pox), and see if any striking analogy exists between them. The Yellow-Fever being a more malignant and mortal disease, must be supposed to arise from a more powerful cause than the small pox; if this cause be a specific contagious matter, it must be consequently propagated oftener and with more certainty, than a malady allowed by every one to be much milder in its operations.

I. The Yellow-Fever recurs at stated periods viz. from July until November, includes its

greatest violence, and disappears at certain others: under circumstances which have no influence on small pox, which observes no regular or stated period for propagating itself.

II. The Yellow-Fever is epidemic in summer and sporadic, during winter, the small pox is communicated with as much certainty and reigns as extensively during winter as in the hottest months of summer.

III. The small pox when it has once infected the system, is incapable of further action on the same person; but the yellow fever attacks the same person as often as the causes are applied which give origin to it; if the yellow fever were really contagious and a person having it once did not secure him from a return (which is the fact) why does it ever disappear, for as the contagion meets with no obstacle from other diseases of more powerful action (for there are few of that class) why does it not exercise an unlimited power? Those who had once recovered, would be reinfected again and again, and thus would the infection spread from family to family, and from city to city, until all who had once been exposed to its influence, were destroyed; but so far from its being spread in this manner, it has never been communicated from one to another in any unequivocal case which I have met with. When the small pox has made its way into any district or country, it never disappears until all who have been exposed

to its influence either by contact or by approaching within its infectious distance have received the contagion, provided they had not before had the disease, or at the time of such exposure, were not labouring under an irritant of stronger action; whereas the yellow fever frequently seizes on one of a family while all the rest having equal intercourse with the diseased, escape the infection.

If Yellow Fever depended on a specific matter why does it exhibit such variety in its appearance? The small pox always shews a regularity in its manner of attack and preserves an uniformity in some of its most characteristic symptoms, whereas what are the various forms under which this fever occasionally disguises itself, sometimes appearing under the garb of a common cold, pueromy, Rheumatism or tooth-ache, at other times assuming the character of cholera morbus, intermittent, apoplexy or gout, can it be supposed, that these dissimilar effects, are produced by any regular or uniform cause like specific contagion, for this latter cannot produce a disease less uniform in its appearance, than small pox or measles. It must, like wine, opium, and ardent spirits, produce similar effects, upon all in like circumstances.

The Yellow Fever may lie dormant for a length of time, unless roused into action by some exciting cause, as fatigue, night watching, intoxication, &c. but the small pox produces its effects

most commonly at a certain and stated time, without the assistance of any exciting cause.

From the above statement, there does not appear to be any similarity existing between the two diseases, nor does the Yellow Fever, seem entitled of any of the essentially necessary characters of a strictly contagious disorder.

But it really appears as if the existence of a contagious principle in the Yellow Fever, had been taken for granted, without even inquiring into the validity of its foundation. Whereas perhaps if strict scrutiny be made, we shall find that such persons as have been supposed, nay positively declared, to have received the infection, by contact with diseased persons, or cloathing, have been themselves, exposed to the same sources, from which the first afflicted persons, derived their disease, viz. noxious effluvia from putrefying vegetable or animal substances.

It is not enough to prove a malady contagious, that while one person labouring under any disease, a second, third, or even the whole family having communication with the sick, should afterwards be seized with a similar distemper, the same general cause (in all probability) which produced disease in the person first affected, might operate on all others, subsequently attacked, and the difference in time of seizure, be occasioned, altogether, from different periods of being exposed to an exciting cause. It does not appear therefore neces-

sary to suppose contagion generated in those individuals first diseased, and from them communicated to all others who may afterwards happen to labour under a similar disease, unless we are determined, at all events, to take the existence of such a principle for granted.

I have heard it repeatedly advanced, as a proof of the contagious nature of the Yellow Fever, that Dr. Cooper died at the City Hospital in 1798, and that he received the infection from the patients in that place. Such a statement as this is generally thought sufficient but for my part, I could wish a stricter enquiry to be made, whereon we will detect much error and fallacy. But let us for a moment suppose the disease was really contagious, and that Dr. Cooper received the infection from the patients at the above place, how shall we reconcile the whimsical and capricious nature of this wonderful matter? How did all others* having constant communication with the sick, escape? Is it the common character of contagious diseases to exhibit and extend their influence to one single individual of a whole hospital or family, and avoid all the rest? For my part, I regard such instances as the most convincing arguments against the contagious nature of the disease. How then, it may be demanded, did

* Dr. Physick was equally exposed to the patients, as Dr. Cooper—Mr. May and myself were constantly in the wards with the sick, and at the time of his illness, slept in the same room with him, not one of us contracted the disease.

Dr. Cooper contract his disease? This question is easy of solution, by admitting the persons to whom he was exposed, to have received their complaints from the impure and noxious air of the city; and that he derived his, from the same source; for it is well ascertained, that he was in the city about ten days before, and visited the most unhealthy parts of it, to obtain some of the air, in order to subject it to Eudiometrical experiments. Perhaps it may be supposed that the interval between the time of his exposure in the city, and the time of attack, was too long to render this source the probable origin of his disease; but that miasmata may lie in the system even for a greater length of time, unless called into action by some exciting cause, will be rendered probable from the following fact*. "How long the noxious matter may lie in the system, without producing its effects, is a difficult matter to ascertain precisely; but examples have come under my own knowledge, where the disease has been excited into action, three weeks after the patients had ceased to be exposed to the cause which produced it." If then, we can trace the fever, to its true original source why should we resort to an ideal one, which, if admitted, would lead to the greatest absurdities?

From Dr. Rush's account of this fever, it is clearly proved, that the miasmata may be received into the system, and pass off without producing

* Doctor John Hunter, on the diseases of Jamaica.

disease, unless excited into action by some irregularity in diet, dress, &c. which could not possibly be the case, if it depended on specific contagion.

A circumstance which has been much resorted to, in support of the contagious quality of this disease, is a case which occurred in Fairfield, in the state of Virginia, in which it was stated, and as generally believed, that the clothes of Mr. W. Washington, who had died with the yellow fever in the year 1793†, had been sent home, and from them, almost the whole family received the disease, and several died with it; but upon a stricter enquiry into the circumstance, it is ascertained, that no clothes, nor any thing else were received‡ but that a mill-dam had accidentally broke and overflowed a large tract of land, and from the continuance of the water over the grass, &c. vegetation was destroyed, and in ten or twelve days, a most nauseous exhalation was emitted from the mud, grass, and a quantity of fish, in a state of putrefaction; and from this source they derived the great malignity and mortality of their disease.

If such be the facts on which so much confidence and reliance have been placed to prove this*

† At Philadelphia,

‡ The error in the statement of this circumstance was detected by Professor Woodhouse, who, on writing to the family physician for his opinion, received an answer to the above effect.

* Dr. Rush, MS. L. there are ten false facts, for every false Theory in medicine.

disease contagious, it appears probable (as what has happened often, may happen oftener), if all the other cases of the alleged infectious property of Yellow Fever, could be subjected to the same scrutiny, they would be found equally equivocal and false.

A third case, which I will relate, occurred, during the autumn of 1798. A gentleman in the state of New Jersey, visited at a house where this fever was very malignant, and had proved fatal to several of the family: On his return home he was seized with the same disease; here the distemper was thought unequivocally to have been taken by contagion; but if we trace the circumstances which ensued, we shall find a want of validity even in this fact; no person received the disease from him, though he was constantly attended by the members of the family, until his death†; if the disease could be received by contagion in the country, it certainly might again be communicated from the person who had contracted it, in this manner, to others having constant intercourse with him, which was not the case: It may be asked perhaps, how we shall account for his illness, this is a matter of no difficulty, by allowing the persons to whom he was exposed to have received their complaints from local causes (which was the fact as related by the attending physician) and he being exposed to the same source, by remaining at the above place all night, received the same miasmata that the first diseased persons contracted

† He died with the black vomit.

their indispositions from. Out of near a hundred cases of this fever, attended by the above physician, no instance of a contagious principle appeared.

If however these cases should be deemed equivocal, the following facts must prove insuperable to the admission of a single doubt being entertained by the greatest skeptic. During the prevalence of the yellow fever in Philadelphia and many other cities of the United States, in the year 1798, Doctor Physic, Mr. May my worthy friend and fellow graduate and myself, resided at the City Hospital of Philadelphia, during the summer and autumn, we dissected one hundred persons who had died of that disease, and as the stomach appeared to be the great seat of the malady, our researches were principally directed to this viscus, which in the greater number of instances was found very highly inflamed or sphaclated, containing large quantities of the black matter so well known by the name black vomit, in which our hands were almost daily involved, and frequently when they were wounded by the dissecting knives ; and under all these extremely favourable circumstances for the propagation of contagion, no instance of this kind occurred. From the great number of patients admitted (upwards of one Thousand), there were necessarily required a considerable number of nurses and other attendants, amounting to more than fifty from first to last ; they continued almost constantly in rooms that contained frequently thirty, and always twenty

patients, nay further, they laid upon the beds with the sick, and were frequently vomited on by them, made use of the same cups, spoons, and bowls, &c. yet in no instance whatever, was the disease communicated to any individual. Some of the same persons after remaining at the place above mentioned for six weeks in perfect health, exposed to every exciting cause of fever, on returning to the city, in five or six days after contracted the disease and died.

Here unfortunately for the general opinion, that some constitutions exempt from diseases while others dispose to them, no peculiarity could have existed; for the same persons who had for many weeks been exposed to the effluvia, emitted from the sick, in its most concentrated state, without receiving the infection, soon after entering the city where its true cause existed, were seized with the disease.

But not contented to rest the opinion of its non-contagious nature upon the epidemic of this year only; I have enquired into the phenomena which occurred, during its prevalence in the year 1793 *. At the Bush Hill hospital, about a mile and a half from the city of Philadelphia, where the sick were crowded together in the warmest months of summer and autumn; a number of nurses and other attendants were necessarily employed in constant

* Doctor Devez's history of the yellow fever as it occurred in 1793.

attention to the patients, none of whom ever received the infection: Doctor Deveze, and several assisting physicians, dissected a number of persons who died at the above place, with the yellow fever (besides having constant communication with the diseased), yet under circumstances like these no such thing as a contagious principle discovered itself.

In 1797, the Hospital was erected on the east side of the river Schuylkill (at the same place as it was in 1798), in which there were frequently 70 or 80 patients at a time, under the care of one resident physician, and two daily visiting, together with the necessary number of nurses &c. thickly crowded together and constantly attended as they were, yet under these circumstances was no infection communicated. †Another fact which will render the contagious nature of this disease improbable is, that children frequently are suckled, by mothers labouring under it without receiving the infection ; a case of this kind occurred at the city Hospital during the autumn of 1798. Mary Wood was admitted with a high grade of yellow fever, and during her illness her infant slept in the bed, and sucked her constantly ; it did not receive the fever.

A case of the same nature is mentioned by Doctor Rush, in his fourth vol. Medical Inquiries, page 36. And similar instances are recorded by the warmest

† This information was received from Doctor J. Duffield, and communicated to me by Doctor Rush.

advocate * for the contagious nature of the disease. If however, any may yet believe in the possibility of this fever ever being contagious, I will submit to their consideration the following fact, †
 " seven men belonging to the Alms house of the
 " city of New York, were employed during the
 " whole of the sickly season of 1798 in putting the
 " persons dead of the plague into coffins, and in
 " the course of their service, they handled upwards
 " of five hundred corpses in different stages of pu-
 " trefaction, although these men were so much in-
 " commoded by the pestilential quality of the air
 " in the rooms which they entered, and frequently
 " obliged to vomit, not one of them were so much
 " indisposed during the whole season, as to discon-
 " tinue his employment, and neither in the state
 " hospital or city hospital of New York, did the
 " disease shew any contagious quality."

Will it be said, that the attendants of the sick become habituated to the disease and thus escape the infection, if so I will ask how they escaped the first impression? for they are not then habituated to its stimulus.

It may possibly be supposed, that, though the fever may not be contagious in an Hospital or other place out of towns, it may be so in large cities; this cannot be the case as is proved from women and children, most frequently escaping, in those pla-

* Memoirs of the Yellow Fever of 1798, by Wm. Currie.

† Medical repository of New-York, vol. 2, Number 3,
 page 313

ces, which would be quite the contrary if contagion was the cause, they being most confined to the abodes of the sick, would undoubtedly be the first to be afflicted. Another fact which renders this cause of the fever, improbable, is, that poor people, are always more violently and frequently attacked, than persons in better circumstances, this cannot be owing to any peculiar attachment, which contagion has to this unfortunate class of citizens, but may be readily explained from their greater exposure to the vicissitudes of the atmosphere.

This disease always disappears for the most part upon the setting in of cold weather, whereas if contagion were its cause, it would undoubtedly be communicated more freely in winter than during the hottest months of summer. In cold weather when the doors and windows, are closed, it must be clear, that a less supply of pure air, exists, than in summer, when the apartments of the sick are open on all sides to a free ventilation. It would appear then that warm weather must be unfavourable to the spreading of contagious diseases. How then shall we account for the great mortality of this fever during the warm months of summer? this is readily explained by referring its cause to certain states of the atmosphere which disposes to the putrefaction of vegetable and animal substances, which I have in a former part of this essay, endeavoured to prove the true cause of intermittent,

remittent, bilious, and yellow fever, a power great and extensive in its operation upon the animal world.

To conclude, the interest of our sea port towns, the safety of our commerce, and the calls of humanity, are equally concerned in abolishing the belief of the contagious nature of this fever.



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